



Please amend Claim 40 as follows:

40. (Amended) A method of producing a highly ductile weld as in Claim 35, wherein
said substantially pure inert gas comprises argon gas in combination with a
reducing gasses.

Please amend Claim 41 as follows:

41. (Amended) A method of creating a welded ductile iron joint having a yield
strength of less than ~~about 35000 psi~~ a tensile strength of a heat affected zone in
said ductile iron joint, comprising compensating for a brittleness of ~~a~~ said heat
affected zone by creating a highly ductile weld bead using a filler metal or a
consumable electrode of a high ductility material consisting essentially of nickel.

Please cancel Claim 43

43. CANCELLED

Remarks

Reconsideration and re-examination is respectfully requested in light of
the foregoing amendment, and in consideration of these remarks.

Claim Objections (p. 2, Para. 1)

The examiner objects to Claims 22 and 40 because of the following formalities: in Claim
22, two periods appear; and in Claim 40, the term “gasses” is used in error. Applicant
has corrected these informalities by amendments to the claims, above. Specific recitation
is not believed necessary in light of the obvious nature of the changes.

Claim Rejections – 35 U.S.C § 112

Enablement - Examiner's p. 2, para. 2

The Examiner rejects Claims 41-43 on the basis that such claims are not enabled,
due to absence of tensile tests or data tables in the specification. Applicant has amended
Claim 41 (and, by dependency, Claim 42) to remove the recitation of the specific yield

strength. The claim now more broadly refers to the failure point in functional terms, as supported by the specification at page 14, lines 5-10.

Indefiniteness - Examiner's p. 2, para. 3

The Examiner rejects Claims 4,7,10, 13, and 18-25 for indefiniteness, on the basis that the term "tension anomalies" is not defined. Applicant respectfully notes that the specification expressly defines the term at page 5, lines 11-12 (in the paragraph that begins "Where welding is performed on ductile iron..."), which definition is believed to be sufficient. This express definition states:

[T]hose in the art occasionally refer to such tension anomalies variously as "inclusions," "porosity," "pitting," and other terms indicating a perceptible lowering of smoothness or purity of the weld body, particularly at the surface, but also in cross-sectional view[.]

No correction is made because citation of the definition in the specification is believed to satisfy the requirement.

Claim Rejections – 35 U.S.C. 102

Badia - Examiner's p.3, para. 5

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. See, e.g., MPEP § 2131. The Examiner rejects Claims 1-25 and 41-43 on the basis of anticipation by Badia (U.S. Pat. 4,624,706), asserting that Badia discloses a crack-less weld made using weld wire constructed from pure nickel. Applicant respectfully traverses this rejection on the following independently sufficient basis: (1) Badia does not employ substantially pure nickel when welding, (2) Badia is not an enabling prior art disclosure, (3) Badia omits higher order passes and (4) Badia omits multiple workpieces.

(1) Badia Does Not Teach Pure Nickel.

When the Applicant refers to nickel content, the reference takes into account all flux and coatings (Spec. at p11, lines 17-20),¹ which Badia does not take into account in its assessment of nickel purity. Therefore, reference to "pure" in Badia does not have the same meaning as it does in the current application. By way of example, Badia flux coats

¹ "These figures of nickel purity include the entirety of the weld wire 11 and all coatings, such that a flux-coated weld wire 11 having a theoretical 100% nickel core, and having a flux coating equal to 20% of the flux-coated weld wire by weight would be considered an 80% pure nickel weld wire 11." Spec. at p. 11, lines 17-20.

the weld wires (Badia 4:29-30), which dilutes the nickel content. The flux in Badia is clearly present in meaningful amounts, as evidenced by the fact that flux and slag (typically formed by flux) are assumed by Badia to be present and to cause major effects. See, e.g., Badia at 2:4-7; 4:29-39; 4:51-52; 4:57-58; 4:60; and 5:9-11 in view of 4:57-58.² Further, Badia's references to nickel purity are in the context of the step of forming the extruded wire, which is followed by a flux coating step. Badia at 4:29-31. Badia's use of the term "pure nickel" clearly refers to only the core of a flux-coated wire. Those in the industry would interpret the amount of flux in Badia to be amount that dilutes the nickel in the whole wire structure and weld pass resultant beyond the scope of "substantially pure nickel." Badia thus fails to teach substantially pure nickel within the meaning of the claims.

A possibility that Badia does or could employ substantially pure nickel is not sufficient to maintain an anticipation rejection. Where an element or limitation is not expressly stated in the cited reference, the Examiner must apply the standards for inherent disclosure.³ For a rejection based on inherency, the Examiner must indicate specific "rationale or evidence tending to show inherency." MPEP § 2112. That rationale must explain why the missing element is *necessarily* present in the cited reference.⁴

(2) Badia Is Not an Enabling Prior Art Reference.

"In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." MPEP 2121.01. Badia does not teach or enable welds or processes, but only a method of making wire. First, as noted above, flux in Badia's process is clearly critical, given that centerline cracks were avoided only by changing the concavity of the weld (Badia at 5:9-11), which requires "changes in flux composition or welding conditions" (Badia at 4:57-58). Badia fails to identify the amount and nature of flux necessary to achieve its results. Accordingly, no

² Column 5:25 through the end of the Badia specification relates to a cuprous weld-wire in which nickel comprises between only 30% and 70% of the wire, rendering this section clearly outside the scope of the claims.

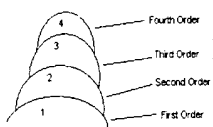
³ Corning Glass Works v. Sumitomo Electric U.S.A., Inc., 868 F.2d 1251, 1255 (Fed. Cir. 1989) ("Anticipation requires that every limitation of the claim in issue be disclosed, either expressly or under principles of inherency, in a single prior art reference. Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 771, 218 U.S.P.Q. 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984).").

⁴ Inherent disclosure anticipates only if the result MUST obtain, not if it CAN obtain. Trintec Industries, Inc. v. TOP-U.S.A. Corp., 295 F.3d 1292 (Fed. Cir. 2002).

teaching is present that could be successfully applied to Applicant's claims to achieve a welding result. Second, Badia's own description indicates that the unidentified flux process failed for at least one rod. Badia, at 5:21-24. Third, Badia fails to provide any detail about the method of production of the welds, even in light of the conventional wisdom (evidenced at Spec. p. 5, lines 27-30) that high purity nickel – in the absence of flux – oxidizes too rapidly for avoiding tension anomalies.

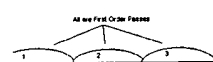
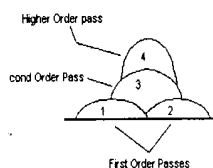
(3) Badia does not describe a "higher order pass."

Applicant's claims 1-25 all refer to a "higher order pass," which applicant defines at Spec. p. 11, lines 1-8. For the sake of synopsis and not alteration or limitation of the specification, Applicant notes that a higher order pass is created by the third and later passes in a series of passes that overlay one another. The figure at the left is exemplary, showing third and fourth order passes as the "higher order passes." Badia makes no reference that designates a higher order pass.



At Column 5, lines 4-15, Badia refers to fillet welds, but does not describe number or arrangement of passes. No basis exists for concluding that this includes a higher order pass.

At Column 5, lines 15-25, Badia does refer to a "Triple Bead-On-Steel-Plate" test, in which it is reasonable to assume that three passes were involved. Badia does not, however, provide any basis for concluding that all passes were sequential atop one another. A common welding operation for three beads would be to lay two beads adjacent one another, followed by a third stacked on those two base beads, as shown to the left. The result is a "pyramid" arrangement, in which the two base beads are first order passes and the third bead is only a second order pass. In this arrangement, though three *beads* are run, no *third order* pass (or other higher order pass) is created until the fourth bead. Again, in light of the conventional wisdom regarding the difficulty of welding pure nickel (see Spec. at 5:27-30), unless specifically stated otherwise, a person of ordinary skill in the art would most likely interpret the description of Badia's triple pass to be the pyramid arrangement, rather than a sequential bead-atop-bead-atop-bead arrangement. In fact, Badia's Triple Bead-On-Steel-Test can also be interpreted to refer to a single layer of passes laid immediately adjacent one another, such that all are first order passes (as shown to the left). Further still, at best the Badia reference must be



analyzed under inherency and enablement rules, under which analysis it fails to qualify as an anticipating reference.

With respect to Claim 17, no discussion in Badia supports any presence of a fourth order pass.

(4) Badia's Triple Bead-On-Steel-Plate Omits a Joint Comprising Two Workpieces.

Applicant's claims 1-15 refer to a weld joint comprising a first workpiece and a second workpiece. Badia's Triple Bead-On-Steel-Plate test described at 5:15-25 occurs on a single plate, rather than at a weld joint. Only one workpiece is involved, rendering the second workpiece an omitted element of the claims. This portion of the Badia reference thus cannot be the basis of a case of anticipation. As seen above, Badia's other reference to welding (at 5:4-15) does not disclose any number or arrangement of passes, so no higher order pass can be deduced from this reference location, either. The portions of Badia at 5:25 and following are related to a cuprous-content weld wire with relatively low nickel.

Badia - Concerning Claims 41-43 (Examiner's para. 5, continued)

Badia similarly fails to anticipate Claims 41 through 42 for failure to include all elements of the claims. Badia makes no reference to ductility of the weld as compared to the HAZ. Further, with respect to Claim 43, Badia fails to meet the requirement that the filler metal or consumable electrode consist essentially of nickel, for the reasons related to flux composition, stated above. Claim 43 is cancelled.

Dixon - Examiner's p. 4, para. 6

The Examiner rejects Claims 41-42 over Dixon (U.S. Patent 2,995,815) on the basis that Dixon discloses welding of ductile iron with nickel to produce a weld joint with 23 to 40 tsi. Applicant has amended Claim 41 to include the limitation of Claim 43 (and has cancelled Claim 43). Originally and amended Claims 41 and 42 contain elements not present in Dixon. Namely, Claim 41 requires the use of material consisting essentially of nickel as the consumable electrode or filler metal. The material in Dixon, by contrast, includes only 3% to 7% nickel. Dixon at 2:23-30. Claim 42 includes the further limitation that no pre-heating, post-heating, or chemical antimartensitizing treatments are employed. Dixon employs both pre-heat and post-heat treatment. Dixon at 3:4-7; 3:71-73; and 4:30-35.

Claim Rejections – 35 U.S.C. 103

Badia In View of Rogers/Wasserman – Examiner's p. 4, para. 8

The Examiner rejects Claims 26-40 on the basis of Badia in view of Rogers (U.S. Patent 3,328,557) or Wasserman (U.S. Patent 3,253,950), finding that with respect to Applicants claims Badia fails to disclose only (1) inert gas, or (2) spray transfer, and that such elements are taught by Rogers (inert gas with nickel electrodes), or by Wasserman (spray transfer for cast iron).

a. **Badia's Missing Elements Are Not Shown By Combination**

Applicant respectfully incorporates by reference its responses to the Rejections over Badia pursuant to Section 102. While Claims 26-40 do not specifically use the term "higher order pass," the independent claims 26 and 35 (and thus their dependant claims) require a first pass, an intermediary pass atop that first pass, and a final pass atop the intermediary pass. Additionally, in each of Claims 26 and 35 (and thus their dependant claims), require at least one pass after the intermediary pass to be "in a substantially undiluted condition" Accordingly, the discussion with respect to higher order passes and purity of nickel, above, demonstrates that elements remain lacking from the combinations of references proposed. Further, the additional references fail to provide enablement of Badia's shortcomings. In sum, because of the missing elements recited in the previous section, Badia is not a sufficient base for an obviousness rejection, and the combined references fail to fill its shortcomings.

b. **No Teaching Or Suggestion to Combine**

The Examiner does not identify any teaching or suggestion to combine the concepts between Badia and either Wasserman or Rogers. The burden of showing a prima facie case of obviousness lies squarely on the Examiner.⁵ "If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness..." MPEP § 2141. The Examiner must "explain where the motivation for the rejection is found, either in the references, or in the knowledge generally available to one in the art." MPEP 707.07, *re Para. 7.37.04*. Citation to 'general knowledge' as a source of suggestion is insufficient. In re Lee, 277 F.3d 1338 (Fed. Cir. 2002)

⁵ MPEP § 2141 provides: "The legal concept of *prima facie* obviousness is a procedural tool of examination which applies broadly to all arts. It allocates who has the burden of going forward with production of evidence in each step of the examination process ... The examiner bears the initial burden of **factually supporting** any *prima facie* conclusion of obviousness." (emphasis by bold added)

(overturning Board's Affirmation of Examiner, and stating, "the Board rejected any need for any specific hint or suggestion in a particular reference,Omission of a relevant factor required by legal precedent is both legal error and arbitrary agency action.")

The Examiner offers no specifically identifiable reference, statement, or location providing a suggestion or motivation to combine. The Examiner does not offer any citation or reference to material suggesting the combination. Potential advantages of the combination suggested in hindsight in view of the invention, are not sufficient. See, e.g., In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1998) "prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness").

c. Wasserman Cannot Be Combined Without Destroying Function

Further, Wasserman cannot be combined as a 103 reference. The entire point of Wasserman's disclosure is to add a substantial amount of flux, which necessarily will reduce the nickel purity of any electrode. See, e.g., Wasserman at 1:27-30 and 2:44-70. Moreover, the disclosure in Wasserman relates to the use of an "essentially ... cast iron rod" as the electrode. Wasserman, at 1:33-36 and 2:72-3:1. Substituting pure nickel for the cast iron in Wasserman would impermissibly destroy Wasserman's function. Moreover, Wasserman suggests the spray transfer technique is a characteristic of the "formulation" set out in its specification, and contains no hint of application in other formulations. See, Wasserman at 2:8-15.

With respect to Rogers, even in combination, the disclosure fails to overcome the critical limitations of Badia, in particular but without limitation the absence of the higher order pass.

Applicant disputes that welding apparatus claimed are functional equivalents for discussion of obviousness, but in light of the foregoing believes that the examiner's comment in this regard is moot.

Other Art of Record

The Examiner has cited but not relied on other art. Because this art is not relied upon in any rejection, no response is necessary. Applicant does not concede that these each demonstrate the points for which the Examiner cites them.

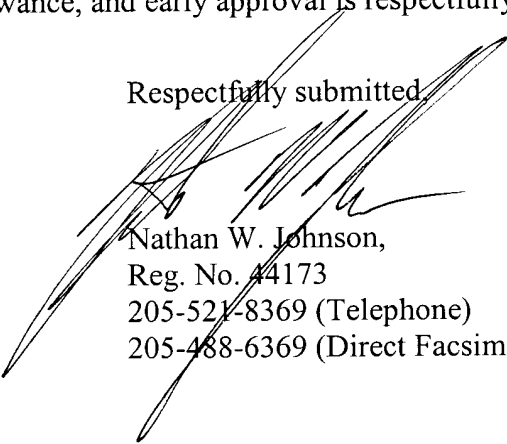
Fees

No fees for additional claims are required. An extension fee is required and enclosed herewith.

Conclusion

Applicant respectfully submits that in light of the foregoing, anticipation and obviousness rejections are unsupported. Applicant has diligently sought to comply with all requirements and to correct all informalities and objections. The Application is believed to be in condition for allowance, and early approval is respectfully requested.

Respectfully submitted,



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Clean Version of Amended Claims

22. (Amended) A weld comprising a plurality of passes, which passes comprise a second order pass and at least one higher order pass; wherein a plurality of said passes generally increase in nickel purity as the order number increases; and wherein further the last of which passes to increase in nickel purity has an average of four or fewer tension anomalies visible to a naked eye per square inch.

40. (Amended) A method of producing a highly ductile weld as in Claim 35, wherein said substantially pure inert gas comprises argon gas in combination with a reducing gas.

41. (Amended) A method of creating a welded ductile iron joint having a yield strength of less than a tensile strength of a heat affected zone in said ductile iron joint, comprising compensating for a brittleness of said heat affected zone by creating a highly ductile weld bead using a filler metal or a consumable electrode of a high ductility material consisting essentially of nickel.

43. CANCELLED